



## DEFENSE INFORMATION SYSTEMS AGENCY

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IN REPLY  
REFER TO: Joint Interoperability Test Command (JTE)

13 Aug 09

### MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of Force10 Networks Adit 600 with Software Release 10.1

References: (a) DoD Directive 4630.5, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004  
(b) CJCSI 6212.01D, "Interoperability and Supportability of Information Technology and National Security Systems," 8 March 2006  
(c) through (e), see Enclosure 1

1. References (a) and (b) establish the Defense Information Systems Agency (DISA), Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification.

2. The Force10 Networks Adit 600 with Software Release 10.1 is hereinafter referred to as the System Under Test (SUT). The SUT was originally manufactured by Turin Networks. During the test window, Turin Networks changed to Force10 Networks. The SUT met all of the interface and functional requirements as set forth in appendix 9 of reference (c) using test procedures derived from reference (d) and is certified for joint use within the DSN as a Strategic Network Element (S-NE). No other configurations, features, or functions, except those cited within this report, are certified by the JITC. This certification expires upon changes that affect interoperability, but no later than three years from the date of this memorandum.

3. This finding is based on interoperability testing conducted by JITC, review of the vendor's Letters of Compliance (LoC), and Defense Information Assurance (IA)/Security Accreditation Working Group (DSAWG) accreditation. Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca, Arizona, from 8 December 2008 through 2 January 2009. Review of the vendors LoC was completed on 18 May 2009. DSAWG grants accreditation based on the security testing completed by DISA-led Information Assurance test teams and published in a separate report (reference (e)). DSAWG accreditation was granted on 11 August 2009. The Certification Testing Summary (Enclosure 2) documents the test results and describes the test configuration.

4. The SUT Interoperability Test Summary is shown in Table 1 and the Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in Table 2.

**Table 1. SUT Interoperability Test Summary**

DSN Access Interfaces																																																																							
Interface	Critical	Status	Remarks																																																																				
2-Wire Analog (GR-506-CORE)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																				
ISDN BRI (U Interface only)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																				
Line Side Loop Start T1 CAS (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																				
T1 CAS DTMF, MFR1, DP (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																				
EIA-232 Serial Interface	No <sup>1</sup>	Not Tested	EIA-232 is offered by the SUT; however it was not tested. The SUT EIA-232 interface is therefore not certified by JITC. This is not a required interface for a S-NE.																																																																				
ITU-T V.35 Serial Interface	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																				
E&M Type I, Type II, Type III, and Type V	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																				
DSN Transport Interfaces																																																																							
Transport Level	Critical	Status	Remarks																																																																				
T1 (B8ZS/ESF) Proprietary Signaling	No <sup>2</sup>	Certified	Met all CRs and FRs.																																																																				
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Synchronization	Yes	Certified	Met all CRs and FRs.																																																																				
Network Management	Yes	Certified	Met all CRs and FRs.																																																																				
Security	Yes	Certified	See note 3.																																																																				
<p><b>NOTES:</b></p> <p>1 The UCR does not stipulate a minimum Access interface requirement for a Strategic Network Element.</p> <p>2 The UCR does not stipulate a minimum Transport interface requirement a Strategic Network Element.</p> <p>3 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (e).</p> <p><b>LEGEND:</b></p> <table> <tr> <td>AMI</td><td>Alternate Mark Inversion</td> <td>GR-506-CORE</td><td>LSSGR: Signaling for Analog Interfaces</td> </tr> <tr> <td>CAS</td><td>Channel Associated Signaling</td> <td>ISDN</td><td>Integrated Services Digital Network</td> </tr> <tr> <td>CRs</td><td>Capability Requirements</td> <td>ITU-T</td><td>International Telecommunication Union - Telecommunication Standardization Sector</td> </tr> <tr> <td>B8ZS</td><td>Bipolar Eight Zero Substitution</td> <td></td><td></td> </tr> <tr> <td>BRI</td><td>Basic Rate Interface</td> <td>kbps</td><td>kilobits per second</td> </tr> <tr> <td>DISA</td><td>Defense Information Systems Agency</td> <td>kHz</td><td>kiloHertz</td> </tr> <tr> <td>DSN</td><td>Defense Switched Network</td> <td>LSSGR</td><td>Local Access and Transport Area (LATA) Switching Systems Generic Requirements</td> </tr> <tr> <td>DP</td><td>Dial Pulse</td> <td></td><td></td> </tr> <tr> <td>DTMF</td><td>Dual Tone Multi-Frequency</td> <td>Mbps</td><td>Megabits per second</td> </tr> <tr> <td>E&amp;M</td><td>Ear and Mouth</td> <td>MFR1</td><td>Multi-Frequency Recommendation 1</td> </tr> <tr> <td>EIA</td><td>Electronic Industries Alliance</td> <td>SF</td><td>Super Frame</td> </tr> <tr> <td>EIA-232</td><td>Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices</td> <td>SUT</td><td>System Under Test</td> </tr> <tr> <td></td><td></td> <td>T1</td><td>Digital Transmission Link Level 1 (1.544 Mbps)</td> </tr> <tr> <td></td><td></td> <td>U</td><td>ISDN BRI 2-wire interface</td> </tr> <tr> <td>ESF</td><td>Extended Superframe</td> <td>UCR</td><td>Unified Capabilities Requirements</td> </tr> <tr> <td>FRs</td><td>Feature Requirements</td> <td>V.35</td><td>Standard for data transmission at 48 kbps using 60-108 kHz group band circuits</td> </tr> <tr> <td>GR</td><td>Generic Requirement</td> <td></td><td></td> </tr> </table>				AMI	Alternate Mark Inversion	GR-506-CORE	LSSGR: Signaling for Analog Interfaces	CAS	Channel Associated Signaling	ISDN	Integrated Services Digital Network	CRs	Capability Requirements	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector	B8ZS	Bipolar Eight Zero Substitution			BRI	Basic Rate Interface	kbps	kilobits per second	DISA	Defense Information Systems Agency	kHz	kiloHertz	DSN	Defense Switched Network	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements	DP	Dial Pulse			DTMF	Dual Tone Multi-Frequency	Mbps	Megabits per second	E&M	Ear and Mouth	MFR1	Multi-Frequency Recommendation 1	EIA	Electronic Industries Alliance	SF	Super Frame	EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices	SUT	System Under Test			T1	Digital Transmission Link Level 1 (1.544 Mbps)			U	ISDN BRI 2-wire interface	ESF	Extended Superframe	UCR	Unified Capabilities Requirements	FRs	Feature Requirements	V.35	Standard for data transmission at 48 kbps using 60-108 kHz group band circuits	GR	Generic Requirement		
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**Table 2. SUT Capability and Feature Interoperability Requirements**

DSN Access Interfaces			
Interfaces	Critical	Requirements Required or Conditional	References
2-Wire Analog (GR-506-CORE)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• Analog interfaces in accordance with UCR, section 7.4 (C)</li> <li>• MOS (R)</li> <li>• MLPP (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R) Analog</li> <li>• Facsimile (R) Analog</li> <li>• Call Control Signals (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> </ul>
ISDN BRI (U-Interface)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• 2 or 4-wire digital interfaces in accordance with UCR, section 7.4 (C)</li> <li>• MOS (R)</li> <li>• MLPP (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R) Analog Only</li> <li>• Facsimile (R) Analog Only</li> <li>• Call Control Signals (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.3</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> </ul>
Line Side Loop Start T1 CAS (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Carrier Group Alarms (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> </ul>
T1 CAS DTMF, DP, MFR1 (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Carrier Group Alarms (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> </ul>
ITU-T V.35 Serial Interface	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• In accordance with ITU-T V.35 (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.2</li> </ul>
EIA-232 Serial Interface	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• In accordance with TIA-232F (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. 9.5.1.2.2</li> </ul>
E&M Type I, Type II, Type III, and Type V	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• E&amp;M Signaling in accordance with UCR, section 7.4</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.1</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> </ul>

**Table 2. SUT Capability and Feature Interoperability Requirements (continued)**

DSN Transport Interface																																																																																			
Interface	Critical	Requirements Required or Conditional	References																																																																																
T1 (B8ZS/ESF) Proprietary Signaling	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Clear Channel Capability (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Carrier Group Alarms (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1.1</li> <li>• UCR App. A9.5.1.1.2</li> <li>• UCR App. A9.5.1.1.4</li> </ul>																																																																																
SUT Features And Capabilities																																																																																			
Feature/ Capability	Critical	Requirements Required or Conditional	References																																																																																
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.5.1.2.7</li> </ul>																																																																																
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R) <ul style="list-style-type: none"> <li>- Local Management (Front Panel and/or External Console) (C)</li> <li>- ADIMSS (C)</li> </ul> </li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.5.2.1</li> <li>• UCR para. A9.5.2.2</li> <li>• UCR para. A9.5.2.3</li> <li>• UCR para. A9.5.3</li> </ul>																																																																																
Security	Yes	<ul style="list-style-type: none"> <li>• DIACAP (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.6</li> </ul>																																																																																
<p><b>NOTES:</b></p> <p>1 The UCR does not stipulate a minimum Access interface requirement for a Strategic Network Element.</p> <p>2 The UCR does not stipulate a minimum Transport interface requirement for a Strategic Network Element.</p> <p><b>LEGEND:</b></p> <table> <tr> <td>A</td><td>Appendix</td><td>GR</td><td>Generic Requirement</td></tr> <tr> <td>ADIMSS</td><td>Advanced DSN Integrated Management Support System</td><td>GR-506-CORE</td><td>LSSGR: Signaling for Analog Interfaces Integrated Services Digital Network</td></tr> <tr> <td>AMI</td><td>Alternate Mark Inversion</td><td>ISDN</td><td>International Telecommunication Union - Telecommunication Standardization Sector</td></tr> <tr> <td>App.</td><td>Appendix</td><td>ITU-T</td><td></td></tr> <tr> <td>B8ZS</td><td>Bipolar Eight Zero Substitution</td><td>kbps</td><td>kilobits per second</td></tr> <tr> <td>BERT</td><td>Bit Error Rate Test</td><td>kHz</td><td>kiloHertz</td></tr> <tr> <td>BRI</td><td>Basic Rate Interface</td><td>LSSGR</td><td>Local Access and Transport Area (LATA) Switching Systems Generic Requirements</td></tr> <tr> <td>C</td><td>Conditional</td><td>Mbps</td><td>Megabits per second</td></tr> <tr> <td>CAS</td><td>Channel Associated Signaling</td><td>MFR1</td><td>Multi-Frequency Recommendation 1</td></tr> <tr> <td>DIACAP</td><td>Department of Defense Information Assurance Certification and Accreditation Process</td><td>MLPP</td><td>Multi-Level Precedence and Preemption</td></tr> <tr> <td>DP</td><td>Dial Pulse</td><td>MOS</td><td>Mean Opinion Score</td></tr> <tr> <td>DS1</td><td>Digital Signal Level 1</td><td>R</td><td>Required</td></tr> <tr> <td>DSN</td><td>Defense Switched Network</td><td>SF</td><td>Super Frame</td></tr> <tr> <td>DTMF</td><td>Dual Tone Multi-Frequency</td><td>SUT</td><td>System Under Test</td></tr> <tr> <td>E&amp;M</td><td>Ear and Mouth</td><td>T1</td><td>Digital Transmission Link Level 1 (1.544 Mbps)</td></tr> <tr> <td>EIA</td><td>Electronic Industries Alliance</td><td>TIA</td><td>Telecommunications Industry Association</td></tr> <tr> <td>EIA-232</td><td>Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices</td><td>U</td><td>ISDN BRI 2-wire interface</td></tr> <tr> <td></td><td></td><td>UCR</td><td>Unified Capabilities Requirements</td></tr> <tr> <td></td><td></td><td>V.35</td><td>Standard for data transmission at 48 kbps using 60-108 kHz group band circuits</td></tr> <tr> <td>ESF</td><td>Extended Superframe</td><td></td><td></td></tr> </table>				A	Appendix	GR	Generic Requirement	ADIMSS	Advanced DSN Integrated Management Support System	GR-506-CORE	LSSGR: Signaling for Analog Interfaces Integrated Services Digital Network	AMI	Alternate Mark Inversion	ISDN	International Telecommunication Union - Telecommunication Standardization Sector	App.	Appendix	ITU-T		B8ZS	Bipolar Eight Zero Substitution	kbps	kilobits per second	BERT	Bit Error Rate Test	kHz	kiloHertz	BRI	Basic Rate Interface	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements	C	Conditional	Mbps	Megabits per second	CAS	Channel Associated Signaling	MFR1	Multi-Frequency Recommendation 1	DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	MLPP	Multi-Level Precedence and Preemption	DP	Dial Pulse	MOS	Mean Opinion Score	DS1	Digital Signal Level 1	R	Required	DSN	Defense Switched Network	SF	Super Frame	DTMF	Dual Tone Multi-Frequency	SUT	System Under Test	E&M	Ear and Mouth	T1	Digital Transmission Link Level 1 (1.544 Mbps)	EIA	Electronic Industries Alliance	TIA	Telecommunications Industry Association	EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices	U	ISDN BRI 2-wire interface			UCR	Unified Capabilities Requirements			V.35	Standard for data transmission at 48 kbps using 60-108 kHz group band circuits	ESF	Extended Superframe		
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5. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network


JITC Memo, JTE, Special Interoperability Test Certification of the Force10 Networks (formerly known as Turin Networks) Adit 600 with Software Release 10.1

(NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/.gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>.

6. The JITC point of contact is Mr. Cary Hogan, DSN 879-2589, commercial (520) 538-2589, FAX DSN 879-4347, or e-mail to [cary.hogan@disa.mil](mailto:cary.hogan@disa.mil). The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 0820302.

FOR THE COMMANDER:

2 Enclosures a/s

  
for RICHARD A. MEADOR  
Chief  
Battlespace Communications Portfolio

Distribution (electronic mail):

Joint Staff J-6

Joint Interoperability Test Command, Liaison, TE3/JT1

Office of Chief of Naval Operations, CNO N6F2

Headquarters U.S. Air Force, Office of Warfighting Integration & CIO, AF/XCIN (A6N)

Department of the Army, Office of the Secretary of the Army, DA-OSA CIO/G-6 ASA (ALT),  
SAIS-IOQ

U.S. Marine Corps MARCORSYSCOM, SIAT, MJI Division I

DOT&E, Net-Centric Systems and Naval Warfare

U.S. Coast Guard, CG-64

Defense Intelligence Agency

National Security Agency, DT

Defense Information Systems Agency, TEMC

Office of Assistant Secretary of Defense (NII)/DOD CIO

U.S. Joint Forces Command, Net-Centric Integration, Communication, and Capabilities  
Division, J68

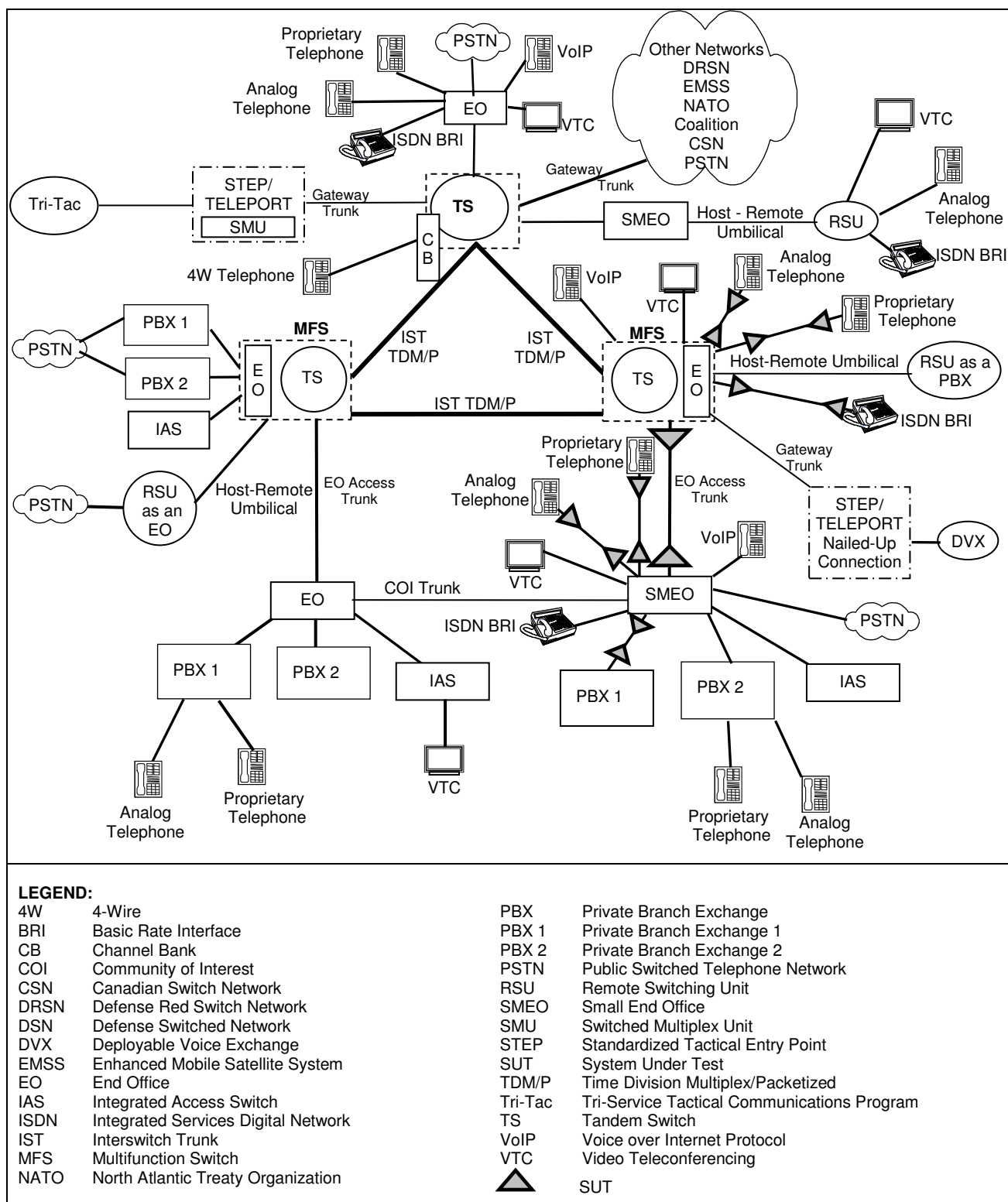
Defense Information Systems Agency, GS23

## **ADDITIONAL REFERENCES**

- (c) Defense Information Systems Agency, "Department of Defense Networks, Unified Capabilities Requirements," 21 December 2007
- (d) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Turin Networks Adit 600 with Software Release 10.1," 11 August 2009

## **CERTIFICATION TESTING SUMMARY**

- 1. SYSTEM TITLE.** Force10 Networks (formerly known as Turin Networks) Adit 600 with Software Release 10.1; hereinafter referred to as the System Under Test (SUT).
- 2. PROPONENT.** Directors of Information Management (DOIM).
- 3. PROGRAM MANAGER.** Mr. Wesley Dodson, IMNW-LNW-IMB, 464 Manscen Loop, Fort Leonard Wood, Missouri, 65473, email: Wesley.dodson@us.army.mil.
- 4. TESTER.** Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.
- 5. SYSTEM UNDER TEST DESCRIPTION.** The SUT can be used in the Defense Switched Network (DSN) as a Strategic Network Element (S-NE). The Adit 600 is rack- or wall-mounted chassis with six service card slots, single controller card slot, and one power supply slot. The SUT platform provides carrier-quality broadband voice and data services for a wide range of applications. The SUT combines multi-network access and multi-service delivery capabilities into one platform. The SUT combines the functions of an 18 Digital Transmission Link Level 1 (T1) digital cross-connect with service grooming and restoration with DS0 voice interfaces, and a variety of standard data interfaces. The service cards are hot-swappable and provide the physical, electrical, and logical connections for analog line terminations, Private Branch Exchange (PBX) interfaces, serial interfaces, and network access. Any service card can be placed in any of the six available slots. The SUT provides connections for a broad combination of voice and data services, which supports up to 18 T1s, 12 International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) V.35 ports, 12 Electronic Industries Alliance (EIA)-232 ports, 40 Basic Rate Interface (BRI) ports, 48 Foreign Exchange Office/Foreign Service (FXO/FS) and 24 Ear and Mouth (E&M) trunks.
- 6. OPERATIONAL ARCHITECTURE.** The Unified Capabilities Requirements (UCR) DSN architecture in Figure 2-1 depicts the relationship of the SUT to the DSN switches.



**Figure 2-1. DSN Architecture**



**7. REQUIRED SYSTEM INTERFACES.** The SUT Interoperability Test Summary is shown in Table 2-1 and the Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in Table 2-2. These requirements are derived from the UCR and verified through JITC testing and review of vendor Letters of Compliance (LoC).

**Table 2-1. SUT Interoperability Test Summary**

DSN Access Interfaces																																																																			
Interface	Critical	Status	Remarks																																																																
2-Wire Analog (GR-506-CORE)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																
ISDN BRI (U Interface only)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																
Line Side Loop Start T1 CAS (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																
T1 CAS DTMF, MFR1, DP (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																
EIA-232 Serial Interface	No <sup>1</sup>	Not Tested	EIA-232 is offered by the SUT; however it was not tested. The SUT EIA-232 interface is therefore not certified by JITC. This is not a required interface for a S-NE.																																																																
ITU-T V.35 Serial Interface	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																
E&M Type I, Type II, Type III, and Type V	No <sup>1</sup>	Certified	Met all CRs and FRs.																																																																
DSN Transport Interfaces																																																																			
Transport Level	Critical	Status	Remarks																																																																
T1 (B8ZS/ESF) Proprietary Signaling	No <sup>2</sup>	Certified	Met all CRs and FRs.																																																																
Features and Capabilities																																																																			
Features and Capabilities	Critical	Status	Remarks																																																																
Synchronization	Yes	Certified	Met all CRs and FRs.																																																																
Network Management	Yes	Certified	Met all CRs and FRs.																																																																
Security	Yes	Certified	See note 3.																																																																
<p><b>NOTES:</b></p> <p>1 The UCR does not stipulate a minimum Access interface requirement for a Strategic Network Element.</p> <p>2 The UCR does not stipulate a minimum Transport interface requirement a Strategic Network Element.</p> <p>3 Security is tested by DISA-led Information Assurance test teams and published in a separate report, reference (e).</p> <p><b>LEGEND:</b></p> <table> <tr> <td>AMI</td><td>Alternate Mark Inversion</td><td>GR-506-CORE</td><td>LSSGR: Signaling for Analog Interfaces</td></tr> <tr> <td>CAS</td><td>Channel Associated Signaling</td><td>ISDN</td><td>Integrated Services Digital Network</td></tr> <tr> <td>CRs</td><td>Capability Requirements</td><td>ITU-T</td><td>International Telecommunication Union - Telecommunication Standardization Sector</td></tr> <tr> <td>B8ZS</td><td>Bipolar Eight Zero Substitution</td><td></td><td></td></tr> <tr> <td>BRI</td><td>Basic Rate Interface</td><td>kbps</td><td>kilobits per second</td></tr> <tr> <td>DISA</td><td>Defense Information Systems Agency</td><td>kHz</td><td>kiloHertz</td></tr> <tr> <td>DSN</td><td>Defense Switched Network</td><td>LSSGR</td><td>Local Access and Transport Area (LATA)</td></tr> <tr> <td>DP</td><td>Dial Pulse</td><td></td><td>Switching Systems Generic Requirements</td></tr> <tr> <td>DTMF</td><td>Dual Tone Multi-Frequency</td><td>Mbps</td><td>Megabits per second</td></tr> <tr> <td>E&amp;M</td><td>Ear and Mouth</td><td>MFR1</td><td>Multi-Frequency Recommendation 1</td></tr> <tr> <td>EIA</td><td>Electronic Industries Alliance</td><td>SF</td><td>Super Frame</td></tr> <tr> <td>EIA-232</td><td>Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices</td><td>SUT</td><td>System Under Test</td></tr> <tr> <td></td><td></td><td>T1</td><td>Digital Transmission Link Level 1 (1.544 Mbps)</td></tr> <tr> <td>ESF</td><td>Extended Superframe</td><td>U</td><td>ISDN BRI 2-wire interface</td></tr> <tr> <td>FRs</td><td>Feature Requirements</td><td>UCR</td><td>Unified Capabilities Requirements</td></tr> <tr> <td>GR</td><td>Generic Requirement</td><td>V.35</td><td>Standard for data transmission at 48 kbps using 60-108 kHz group band circuits</td></tr> </table>				AMI	Alternate Mark Inversion	GR-506-CORE	LSSGR: Signaling for Analog Interfaces	CAS	Channel Associated Signaling	ISDN	Integrated Services Digital Network	CRs	Capability Requirements	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector	B8ZS	Bipolar Eight Zero Substitution			BRI	Basic Rate Interface	kbps	kilobits per second	DISA	Defense Information Systems Agency	kHz	kiloHertz	DSN	Defense Switched Network	LSSGR	Local Access and Transport Area (LATA)	DP	Dial Pulse		Switching Systems Generic Requirements	DTMF	Dual Tone Multi-Frequency	Mbps	Megabits per second	E&M	Ear and Mouth	MFR1	Multi-Frequency Recommendation 1	EIA	Electronic Industries Alliance	SF	Super Frame	EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices	SUT	System Under Test			T1	Digital Transmission Link Level 1 (1.544 Mbps)	ESF	Extended Superframe	U	ISDN BRI 2-wire interface	FRs	Feature Requirements	UCR	Unified Capabilities Requirements	GR	Generic Requirement	V.35	Standard for data transmission at 48 kbps using 60-108 kHz group band circuits
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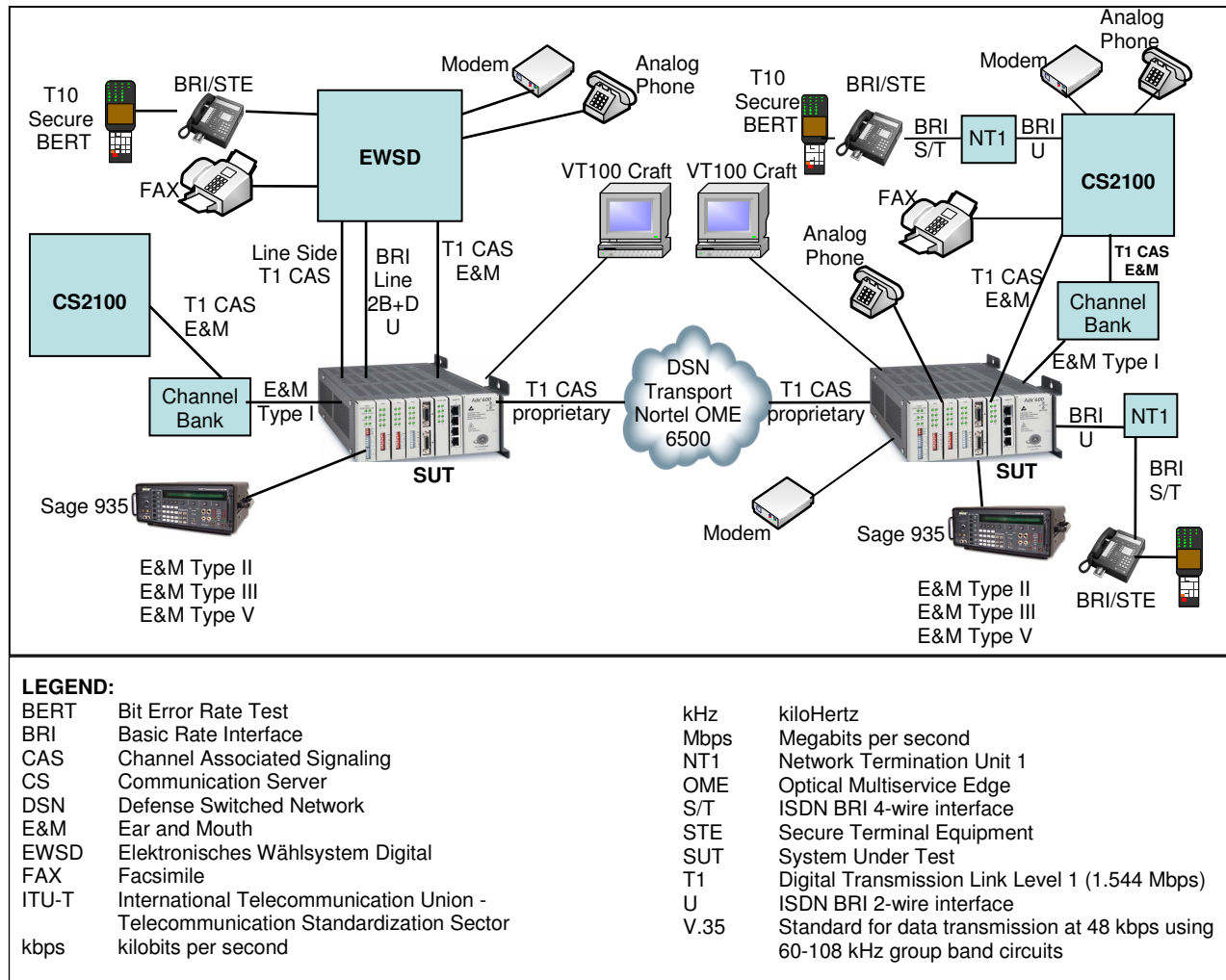
**Table 2-2. SUT Capability and Feature Interoperability Requirements**

<b>DSN Access Interfaces</b>			
<b>Interfaces</b>	<b>Critical</b>	<b>Requirements Required or Conditional</b>	<b>References</b>
2-Wire Analog (GR-506-CORE)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• Analog interfaces in accordance with UCR, section 7.4 (C)</li> <li>• MOS (R)</li> <li>• MLPP (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R) Analog</li> <li>• Facsimile (R) Analog</li> <li>• Call Control Signals (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> </ul>
ISDN BRI (U-Interface)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• 2 or 4-wire digital interfaces in accordance with UCR, section 7.4 (C)</li> <li>• MOS (R)</li> <li>• MLPP (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R) Analog Only</li> <li>• Facsimile (R) Analog Only</li> <li>• Call Control Signals (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.3</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> <li>• UCR App. A9.5.1</li> </ul>
Line Side Loop Start T1 CAS (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Carrier Group Alarms (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> </ul>
T1 CAS DTMF, DP, MFR1 (B8ZS/ESF, AMI/SF)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Carrier Group Alarms (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> </ul>
ITU-T V.35 Serial Interface	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• In accordance with ITU-T V.35 (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.2</li> </ul>
EIA-232 Serial Interface	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• In accordance with TIA-232F (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. 9.5.1.2.2</li> </ul>
E&M Type I, Type II, Type III, IV and Type V	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• E&amp;M Signaling in accordance with UCR, section 7.4</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.1</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> </ul>

**Table 2-2. SUT Capability and Feature Interoperability Requirements (continued)**

DSN Transport Interface			
Interface	Critical	Requirements Required or Conditional	References
T1 (B8ZS/ESF) Proprietary Signaling	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Supervisory Channel Associated Signaling (R)</li> <li>• DS1 Clear Channel Capability (R)</li> <li>• DS1 Alarm and Restoral Requirements (R)</li> <li>• MLPP (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R)</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Carrier Group Alarms (R)</li> <li>• Call Congestion (R)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.5.1.2.4</li> <li>• UCR App. A9.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1</li> <li>• UCR App. A9.5.1.1.1</li> <li>• UCR App. A9.5.1.1.2</li> <li>• UCR App. A9.5.1.1.4</li> </ul>
SUT Features And Capabilities			
Feature/Capability	Critical	Requirements Required or Conditional	References
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.5.1.2.7</li> </ul>
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R) <ul style="list-style-type: none"> <li>- Local Management (Front Panel and/or External Console) (C)</li> <li>- ADIMSS (C)</li> </ul> </li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.5.2.1</li> <li>• UCR para. A9.5.2.2</li> <li>• UCR para. A9.5.2.3</li> <li>• UCR para. A9.5.3</li> </ul>
Security	Yes	<ul style="list-style-type: none"> <li>• DIACAP (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR para. A9.6</li> </ul>
<b>NOTES:</b> 1 The UCR does not stipulate a minimum Access interface requirement for a Strategic Network Element. 2 The UCR does not stipulate a minimum Transport interface requirement for a Strategic Network Element.			
<b>LEGEND:</b>			
A	Appendix	ESF	Extended Superframe
ADIMSS	Advanced DSN Integrated Management Support System	GR	Generic Requirement
AMI	Alternate Mark Inversion	GR-506-CORE	LSSGR: Signaling for Analog Interfaces
App.	Appendix	ISDN	Integrated Services Digital Network
B8ZS	Bipolar Eight Zero Substitution	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
BERT	Bit Error Rate Test	kbps	kilobits per second
BRI	Basic Rate Interface	kHz	kiloHertz
C	Conditional	LSSGR	Local Access and Transport Area (LATA) Switching Systems Generic Requirements
CAS	Channel Associated Signaling	Mbps	Megabits per second
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	MFR1	Multi-Frequency Recommendation 1
DP	Dial Pulse	MLPP	Multi-Level Precedence and Preemption
DS1	Digital Signal Level 1	MOS	Mean Opinion Score
DSN	Defense Switched Network	R	Required
DTMF	Dual Tone Multi-Frequency	SF	Super Frame
E&M	Ear and Mouth	SUT	System Under Test
EIA	Electronic Industries Alliance	T1	Digital Transmission Link Level 1 (1.544 Mbps)
EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices	TIA	Telecommunications Industry Association
		U	ISDN BRI 2-wire interface
		UCR	Unified Capabilities Requirements
		V.35	Standard for data transmission at 48 kbps using 60-108 kHz group band circuits

**8. TEST NETWORK DESCRIPTION.** The SUT was tested at JITC's Global Information Grid Network Test Facility (GNTF) in a manner and configuration similar to that of its DSN operational environment. Testing the system's required functions and features was conducted using the test configurations depicted in Figure 2-2.



**Figure 2-2. Test Configuration**

**9. SYSTEM CONFIGURATIONS.** Table 2-3 provides the system configurations, hardware, and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine interoperability with a complement of DSN switches noted in Table 2-3. Table 2-3 lists the DSN switches which depict the tested configuration and is not intended to identify the only switches that are certified with the SUT. The SUT is certified with switching systems listed on the Unified Capabilities (UC) Approved Products List (APL) that offer the same certified interfaces.

**Table 2-3. Tested System Configurations**

System Name		Hardware/Software Release	
Nortel CS2100		Succession Enterprise (SE) 09.1	
Siemens EWSD		19d with Patch Set 46	
Nortel Optical Multiservice Edge (OME) 6500		Software Release 5.12	
SUT	Adit 600 with Software Release 10.1	<b>Adit 600 Commons</b>	<b>Firmware</b>
		Chassis Type: 600	NA
		Adit 600 Power Supply	NA
		<b>Adit 600 Access Modules</b>	<b>Firmware/Software</b>
		TDM Controller	10.1.0
		FXS 8D	NA
		Quad DS1/E1	2.45
		FXO	1.12
		Octal BRI	1.14
		HD Dual V.35	1.04
		4W E&M/TO 4 Port	1.01
	VT100 Craft (System Administrator Laptop)	120GB hard drive, 1 gig RAM, 1.8 gigahertz	Microsoft Windows XP, Service Pack 2, Hyperterminal
End Instruments			
Device Name		Boot Code	Software Release
L3 Secure Terminal Equipment (STE)		0018	2.2, 2.4, 2.5, and 2.6
OMNI Secure Terminal		02.03	04.18
Sectera Secure Wireline Terminal (SWT)		B00600010000	B00600100000
iLex 760 Security Fax		Not Applicable	Proprietary
<b>LEGEND:</b> 4W      4-wire BRI      Basic Rate Interface CS      Communication Server DS1      Digital Signal Level 1 (1.544 Mbps) (2.048 Mbps European) E&M      Ear and Mouth E1      European Basic Multiplex Rate (2.048 Mbps) EWSD      Elektronisches Wählsystem Digital FXO      Foreign Exchange Office FXS      Foreign Exchange Station GB      gigabyte HD      Hardened Dual Mbps      Megabytes per second NA      Not Applicable RAM      Random Access Memory SUT      System Under Test TDM      Time Division Multiplexing TO      Transmit Only			

**10. TEST LIMITATIONS.** None.

## 11. TEST RESULTS

### a. Discussion

**(1) DSN Access Interfaces.** The SUT met all critical CRs and FRs for the following access interfaces: 2-Wire Analog; 2-Wire BRI; E&M Types I, II, III, and V; Line Side Loop Start T1 Channel Associated Signaling (CAS) Bipolar Eight Zero Substitution (B8ZS)/Extended Superframe (ESF), Alternate Mark Inversion (AMI)/Superframe (SF); T1 CAS Dual Tone Multi-Frequency (DTMF), Dial Pulse (DP), and Multi-Frequency Recommendation 1 (MFR1); and ITU-T V.35 serial interface. The SUT interface access characteristics were tested according to UCR, appendix 9. All of the SUT access interface characteristics were verified through vendor LoC and testing. The EIA-232 is offered by the SUT; however it was not tested. The SUT EIA-232 interface is therefore not certified by JITC. This is not a required interface for a S-NE.

**(a) Interface Characteristics.** The T1 interface characteristics were verified and measured using the pulse mask measurement on the Sunset T10 test set. The SUT met all T1 interface characteristics as required by the UCR, appendix 9.

**(b) Supervisory Channel Associated Signaling.** Trunk seizure, answer supervision, preemption signals, and all other trunk supervisory information sent and received on a per channel basis were passed transparently through the SUT as required in the UCR, appendix 9.

**(c) Alarm and Restoral Requirements.** The UCR, appendix 9, paragraph A9.5.1.1.1, states the Network Element (NE) shall be able to propagate Carrier Group Alarms (CGAs) in accordance with UCR, section 7, upon physical loss of the Time Division Multiplexing (TDM) interface. The SUT is capable of transparently passing the alarm and restoral features of the DSN switch's digital interface unit, which meets the requirement.

**(d) Mean Opinion Score (MOS).** The UCR, appendix 9, paragraph A9.5.1.1, states that a NE shall have a MOS of 4.0 or better for 95 percent of all calls placed. The Sage 935 test set was used to generate simulated voice traffic across the T1 as depicted in Figure 2-2. There were 100 calls placed over the T1 interfaces. The SUT met this requirement with 99 percent of all calls placed via the SUT having an MOS of 4.0 or better for an average of 4.3.

**(e) Bit Error Rate Test (BERT).** The UCR, appendix 9, paragraph A9.5.1.1, requires that the SUT, when inserted in to the test network, will not exceed an end-to-end bit error rate of less than one error in  $1 \times 10^9$  (averaged over a nine hour period). BERTs were conducted across all T1 and line interfaces using SunSet T10 and BRI test sets. The SUT met this requirement with a recorded bit error ratio of one error in  $1 \times 10^{10}$ .

**(f) Secure Transmission (Voice and Data).** The UCR, appendix 9, paragraph A9.5.1.1, states that the introduction of NEs shall not degrade secure transmission for secure end devices. There were 60 secure calls placed between Secure Terminal Equipment (STEs) and Secure Wireline Terminals (SWTs) through the SUT with a 100 percent success rate. The SUT did not degrade secure end device transmissions, which meets the requirement.

**(g) Modem.** The UCR, appendix 9, paragraph A9.5.1.1, states that NEs shall support a minimum modem transmission speed of 9.6 kilobits per second (kbps) across the NE. There were 20 modem calls placed through the SUT using laptop computer. All modem calls had a transmission rate of 32.5 kbps, which meets the requirement.

**(h) Facsimile.** The UCR, appendix 9, paragraph A9.5.1.1, states that NEs shall support a minimum facsimile transmission speed of 9.6 kbps across the NE.

There were 20 facsimile calls placed through the SUT using iLex 760 Security Fax and all calls had a transmission rate of 9.6 kbps or better, which meets the requirements.

**(i) Call Control Signals.** The UCR, appendix 9, paragraph A9.5.1.1, states the NE shall transport all call control signals transparently on the end-to-end basis. The SUT transparently transported all Multi-Level Precedence and Preemption (MLPP) call control signals, which meets the requirement.

**(j) Military Unique Features.** The SUT supports the full complement of Military Unique Features as required in the UCR, section 3. The following types of MLPP calls were placed over all the SUT access interfaces between the switching systems listed in Tables 2-2 and 2-3. All calls were completed successfully and met the MLPP interactions as required by the UCR, section 3.

1. Circuit for Reuse; Answered Call
2. Circuit for Reuse; Unanswered Call
3. Circuit not for Reuse; Answered Call
4. Circuit not for Reuse; Unanswered Call
5. Resources not Available (Intra- and inter-switch)
6. Circuit for Reuse; Answered Call (simultaneous preemption of line and trunk)
7. Circuit for Reuse; Unanswered Call (simultaneous preemption of line and trunk)

**(2) DSN Transport Interfaces.** The SUT only supports T1 B8ZS/ESF Proprietary Signaling. The T1 interface provides 1.544 Mbps of transport bandwidth.

**(a) Alarm and Restoral Requirements.** The UCR appendix 9, paragraph A9.5.1.1.1, states that the NE shall be able to propagate CGAs in accordance with UCR, section 7, upon physical loss of the TDM interface. Voice switching systems shall receive the proper CGAs from the NE upon loss of the transport link between NEs. The SUT is capable of transparently passing the alarm and restoral features of the DSN switch's digital interface unit, which meets the requirement.

**(b) Mean Opinion Score (MOS).** The Sage 935 communications test sets were used for conducting MOS tests. The UCR appendix 9, paragraph A9.5.1.1, states that the introduction of S-NEs shall not cause the end-to-end average MOS to fall below 4.0 as measured over any 5-minute time interval. There were 100 calls placed through the SUT test network all having an MOS of 4.0 or greater with an average of 4.3, which meets the requirement.

**(c) Bit Error Rate Tests (BERTs).** The UCR, appendix 9, paragraph A9.5.1.1, states that the introduction of an S-NE shall not cause the end-to-end digital bit error rate to exceed the requirement of less than 1 error in  $1 \times 10^9$  (averaged over a nine-hour period). The SUT met this requirement with a recorded bit error ratio of one error in  $1 \times 10^{10}$ .

**(d) Secure Transmission (Voice and Data).** The UCR appendix 9, paragraph A9.5.1.1, states that the introduction of NEs shall not degrade secure transmission for secure end devices as defined by Appendix 10. There were 60 secure calls placed over the test configurations shown in Figure 2-2 between STEs and SWTs with a 100 percent success rate without degrading transmissions between end devices, which meet the requirement. These tests included secure voice, data, fax, and crypto rekey.

**(e) Modem.** UCR appendix 9, paragraph A9.5.1.1, states that the NE(s) shall support a minimum modem speed of 9.6 kbps across the associated NE. A total of 60 modem test calls were using lap top computers and secure data modems through the S-NE configuration and all modem calls had a transmission rate of 9.6 kbps or better, which meets the requirements.

**(f) Facsimile.** UCR appendix 9, paragraph A9.5.1.1, and appendix 2, paragraph A2.4.1, state that NEs shall support a minimum facsimile transmission speed of 9.6 kbps across the associated NEs. A total of 60 facsimile calls were placed over the access and transport interfaces through the SUT with a measure transmission speed of 9.6 kbps or better, which meets the requirement.

**(g) Call Control Signals.** UCR appendix 9, paragraph A9.5.1.1, states that the NE shall transport all call control signals transparently on an end-to-end basis. The SUT transparently transported all MLPP call control signals, which meets the requirement.

**(h) Military Unique Features.** The SUT supports the full complement of Military Unique Features as required in the UCR, section 3. The following types of MLPP calls were placed over the SUT transport interface between the switching systems listed in Table 2-3. All calls were completed successfully and met the MLPP interactions as required by the UCR, section 3.

1. Circuit for Reuse; Answered Call
2. Circuit for Reuse; Unanswered Call
3. Circuit not for Reuse; Answered Call
4. Circuit not for Reuse; Unanswered Call
5. Resources not Available (Intra- and inter-switch)
6. Circuit for Reuse; Answered Call (simultaneous preemption of line and trunk)
7. Circuit for Reuse; Unanswered Call (simultaneous preemption of line and trunk)

**(3) Synchronization.** UCR appendix 9, paragraph A9.5.1.2.7, states that the NE shall be able to derive timing signal from an internal source, an incoming digital signal, or an external source in accordance with UCR Section 11.1. The SUT can derive timing from the following methods: Loop A Clock (used to derive the timing from



the T1 bit stream). During this test, the timing for SUT was derived from a dedicated T1 source, which meets the minimum requirement.

#### **(4) Device Management**

**(a) Management Option.** UCR appendix 9, paragraph A9.5.2.1, states that the NE devices are to be managed by at least one of the following: The device may be managed locally by a front or back panel and/or external console control capability shall be provided for local management. NE devices in the DSN may be monitored and managed by the Advanced DSN Integrated Management Support System (ADIMSS) as described in the UCR, section 9. The SUT meets this requirement with an external console which is locally connected to the VT100 Craft Interface DB9 connector located on the front of the System Control Unit card. The System Administration was conducted with a modular PC using the Windows XP 2002 operating system. The System Administration functions include configuring and monitoring of the SUT.

**(b) Fault Management.** UCR appendix 9, paragraph A9.5.2.2, states that the NEs may be capable of performing a self-test diagnostic function on non-active and active channels on a noninterference basis and report any failures to the assigned network management system. The SUT does not have any diagnostic capabilities; however, trunk status and alarms can be monitored via the alarm log, or performance monitoring menu options. This is a conditional requirement for a S-NE, there is no operational impact.

**(c) Loop Back Capability.** UCR appendix 9, paragraph A9.5.2.3, states that the NEs shall provide loop back capability on each of the trunk side interfaces in accordance with ITU-T Recommendation V.54. The SUT does not provide ITU-T V.54 loop back capability. Since this is a conditional requirement for a S-NE, there is no operational impact.

**(5) Operational Configuration Restoral.** UCR appendix 9, paragraph A9.5.3, states that the loss of power should not remove configuration settings. The unit should be restored to the last customer configured state prior to the power loss, without intervention when power is restored. The SUT was placed into a power failure condition then power was restored. The SUT returned to the last customer configured state prior to the power failure, which meets the requirement.

**(6) Security.** Security is tested as part of the Information Assurance testing and is covered under a separate report, reference (e).

**b. Summary.** The SUT is certified for joint use within the DSN as a S-NE in accordance with the requirements set forth in reference (c). When connected to the interfaces certified in this letter, the SUT and its associated applications were transparent to the switching systems interfaced causing no degradation of service or negative impact.

**12. TEST AND ANALYSIS REPORT.** No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>.